

S/N 09/909,488

PATENTIN THE UNITED STATES PATENT AND TRADEMARK OFFICE

| | | | |
|-------------|---|-----------------|----------------|
| Applicant: | Harapanahalli S. Muralidhara et al. | Examiner: | Ana M. Fortuna |
| Serial No.: | 09/909,488 | Group Art Unit: | 1723 |
| Filed: | July 20, 2001 | Docket No.: | 12897.10US01 |
| Title: | NANOFILTRATION WATER-SOFTENING APPARATUS AND METHOD | | |

DECLARATION OF HARAPANAHALLI S. MURALIDHARA
UNDER RULE §1.132

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

I, Harapanahalli S. Muralidhara, citizen of the United States and residing in Plymouth, Minnesota, hereby declare:

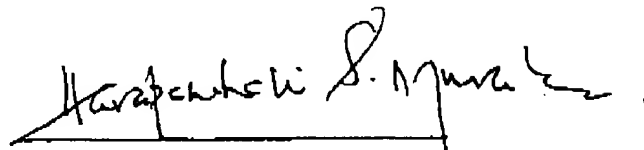
1. My background includes over 28 years of industrial experience in chemical, food processing, and environmental engineering. My research focus is in separations technology, including membrane technologies, membrane fouling research, separation and purification of natural products, and water related processes. I am a co-inventor of over 23 U.S. patents and patent applications, and have edited two books on advances in solid/liquid separation.
2. I am one of the inventors of the above-identified application, which concerns nanofiltration water-softening of potable water.
3. I recently supervised an experiment using a Filmtec NF-70 membrane in order to compare the performance of the NF-70 membrane on softening potable water to the claimed invention in the above-identified application. It is my understanding that the Filmtec NF-70 membrane has been discontinued, but I was able to acquire an unused Filmtec NF-70 for the experiment reported in this declaration.
4. Attached as Appendix 1 is a schematic diagram of the equipment used to carry out the lab scale test to evaluate the performance of the NF-70 membrane. The active

membrane area of the NF-70 membrane used in this experiment was 14.2 cm², the cell held a volume of 300 ml.

5. The feed source water used for this test was municipal tap water obtained from Savage, Minnesota. This feed water had a calcium ion hardness (ppm) of 111.6.
6. Breakthrough pressure for the NF-70 membrane was 210 psi. At 210 psi the observed normalized permeate flux for the NF-70 membrane was 0.006 LMH.
7. The apparatus of Appendix 1 was operated at 210 psi so as to have a composite permeate recovery rate of 80 percent of the input water flow and a discharge of 20 percent of input flow. The permeate had a calcium ion hardness of 28.0, resulting in a calcium ion selectivity of 75 percent.
8. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

28 Feb, 2005.

Date



Harapanahalli S. Muralidhara